



Quality of secondary prevention measures in TIA patients: a retrospective cohort study

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Received 27 September 2011

Accepted 18 February 2012

Published Online First

20 March 2012

ABSTRACT

Objective Pharmacological and lifestyle interventions are recommended for the reduction of stroke risk in people who have had a transient ischaemic attack (TIA). This study aimed to investigate the quality of secondary stroke prevention in primary care following diagnosis of TIA in a specialist clinic.

Methods Quality standards were identified from the Royal College of Physicians (RCP) national clinical guideline for stroke and the general practice Quality and Outcomes Framework (QOF) indicators. Patients who were diagnosed with TIA between February and October 2009 were identified from a TIA clinic database.

Achievement of quality standards was assessed 12–24 months following clinic attendance.

Results General practices were sent structured data collection forms for 233 patients, and the response rate was 80% (n=186). Complete data were available for 163 eligible patients (70%). Overall, 94% were prescribed antithrombotic medication. QOF standards were achieved by 82% for blood pressure ($\leq 150/90$ mm Hg) and 61% for total cholesterol (≤ 5.0 mmol/l). RCP standards were achieved by 35% for blood pressure ($\leq 130/80$ mm Hg) and 28% for total cholesterol (< 4.0 mmol/l). RCP standards for the provision of dietary and exercise advice were achieved by 29% and 34% of patients, respectively.

Conclusion Only a minority of TIA patients achieved RCP standards whereas QOF standards were generally well achieved. Substantial benefits in terms of stroke prevention stand to be gained if risk factors are managed in line with more stringent RCP standards.

INTRODUCTION

Stroke is the third leading cause of death and the leading cause of adult disability in the UK¹ with an annual cost of £8.9 billion when direct care, informal care and indirect costs (*eg, income loss and social benefit payments*) are taken into account.² The early risk of stroke following transient ischaemic attack (TIA) is 9.9%, 13.4% and 17.3% at 2, 30, and 90 days, respectively.³ Furthermore, the 10-year risk of stroke in patients with a 'non-recent' TIA is 18.8%.⁴ The occurrence of TIA therefore represents an important opportunity to implement secondary prevention interventions prior to the occurrence of a potentially disabling stroke.

A number of effective strategies are available for the secondary prevention of stroke. These include blood pressure reduction,⁵ regulation of blood lipids⁶ and prescription of antithrombotic agents.⁷ Additionally, observational studies have reported associations between lifestyle factors and stroke risk.⁸ A modelling study has predicted that 80% of

recurrent vascular events are preventable with improved risk factor management.⁹ However, several studies in patients with cerebrovascular disease have indicated that secondary prevention is often suboptimal.^{10 11 12}

In the UK, optimal management of TIA is defined by the Royal College of Physicians (RCP) National clinical guideline for stroke.¹³ This comprehensive guideline, developed by the Intercollegiate Stroke Working Party, includes recommendations for secondary stroke prevention (see box 1). All recommendations are based on clinical evidence or, in areas where evidence is unavailable, the consensus views of the Working Party. The nature and strength of the evidence behind each recommendation is available on the RCP website (see <http://bookshop.rcplondon.ac.uk/details.aspx?e=250>).

The general practice Quality and Outcomes Framework (QOF) is a voluntary pay-for-performance scheme introduced in 2004 for UK general practices. This scheme offers financial incentives in return for achieving clinical targets relating to 10 chronic conditions, including stroke and TIA. Secondary prevention targets are specified for blood pressure ($\leq 150/90$ mm Hg), total cholesterol (TC) (≤ 5.0 mmol/l), smoking cessation and the use of antiplatelets and anticoagulant medication.¹⁴ Since the introduction of QOF, a greater proportion of stroke and TIA patients have been shown to receive secondary prevention treatment; however, practice variation has been reported in the achievement of QOF indicators.¹⁵

Discrepancies between RCP targets and QOF indicators may represent an organisational barrier contributing to suboptimal secondary prevention.¹² While RCP recommendations are considered 'gold standard' in terms of quality of stroke care, QOF indicators are regarded as 'relatively simplistic' measures of quality.¹² However, it should be noted that QOF indicators are audit criteria rather than targets based on clinical evidence.

Patients with a suspected TIA should receive timely assessment and treatment in a specialist clinic¹³ and 95% of acute trusts now offer a specialist neurovascular clinic for these purposes.¹ The Leicestershire TIA Clinic (established on 1 October 2008) was highlighted as an example of good practice by the National Audit Office¹ and has been used as a sampling frame for this study. Further details about the Leicestershire TIA Clinic are outlined in table 1.

The objectives of this study retrospective cohort study were:

- To describe the quality of secondary prevention care received by TIA patients, following

Box 1 Secondary prevention themes included in the Royal College of Physicians guideline

1. Identifying risk factors.
2. A personalised, comprehensive approach.
3. Lifestyle measures.
4. Blood pressure (target $\leq 130/80$ mm Hg).
5. Antithrombotic treatment.
6. Lipid-lowering therapy (target total cholesterol < 4.0 mmol/l and low-density lipoprotein cholesterol < 2.0 mmol/l).

diagnosis at a specialist TIA clinic, according to standards identified from the RCP guidelines and QOF indicators.

- ▶ To identify areas for quality improvement.

METHODS**Design**

This study was carried out as part of a local audit of TIA patient care. Quality standards were identified from the RCP national clinical guideline for stroke¹⁵ and the general practice QOF indicators¹⁴ (see tables 2 and 3 for audit criteria). Audit approvals were obtained from University Hospitals of Leicester NHS Trust, Leicester City Primary Care Trust and Leicestershire Country and Rutland Primary Care Trust.

Patients were identified retrospectively using hospital records held on the Leicestershire TIA Clinic database. All patients who attend the Leicestershire TIA Clinic are entered onto this database. The study included patients aged ≥ 18 who were diagnosed between 1 February and 31 October 2009. The following patients were excluded:

- ▶ Patients who had left their registered general practice since their TIA.
- ▶ Patients who had died between the date of TIA and date of follow-up data collection.

Data collection

Baseline data were extracted from the TIA Clinic records by a data clerk (see box 2). Follow-up data were collected on secondary prevention care received 12–24 months after TIA diagnosis (see box 2). For this purpose, structured data collection forms were posted to general practitioners (GPs) for completion using information held on general practice records. If GPs failed to respond to the letter after 3 weeks, a second

letter was sent to the practice manager. One reminder telephone call was made to non-responding practice managers after 2 weeks. Since all blood analysis is carried out in secondary care, follow-up data for TC and low-density lipoprotein (LDL) were extracted from hospital databases by a data clerk. Data were analysed using SPSS V.18.

RESULTS**Study population**

A total of 722 patients visited the Leicestershire TIA Clinic between 1 February and 31 October 2009 and, of these, 233 (32%) were diagnosed with TIA. Twenty-three patients were subsequently excluded due to death ($n=9$), relocation to another general practice ($n=7$), unavailability of follow-up data ($n=3$) and the absence of documentation regarding TIA diagnosis in general practice records ($n=4$). Complete data were obtained for 163 patients from 72 general practices. This represents 70% of the original audit sample (see figure 1). The mean (SD) number of patients per practice and per GP were 2.3 (2.3) and 1.3 (0.6), respectively.

Follow-up data were collected between 12 and 24 months following TIA diagnosis with a mean (SD) follow-up duration of 18 (± 3) months. Time frames for consideration of QOF and RCP standards are 12 months and 15 months, respectively. All 163 patients were followed up ≥ 12 months post-TIA, whereas a total of 121 patients were followed up ≥ 15 months post-TIA. The baseline characteristics of the study population are shown in table 4.

Achievement of quality standards

Achievement of quality standards are shown in tables 2 and 3.

Antithrombotic medication

At follow-up, RCP and QOF standards for the prescription of antithrombotic medications were achieved by 93% and 94% of patients, respectively. Excluding the 14 (9%) patients on warfarin, there were 137 patients who were prescribed antiplatelet medication; 42% received both aspirin and dipyridamole, 11% received clopidogrel alone and 44% received aspirin alone.

Blood pressure targets and antihypertensive medication

Ninety-five per cent of patients had their blood pressure documented within the previous 15 months and 82% achieved the QOF target of $\leq 150/90$ mm Hg. Additionally, 90% of patients had their blood pressure documented in the previous 12 months and 35% achieved the RCP target of $\leq 130/80$ mm Hg.

Table 1 Characteristics of the Leicestershire TIA Clinic

Service organisation	Provides a single point of assessment for suspected TIA for all patients living in Leicester, Leicestershire and Rutland, UK (187 general practices, population of 957 821) Located in secondary care Open 7 days per week
Access	Referral from GP, emergency department or emergency admissions unit Risk assessment using the ABCD2 tool required prior to referral
Health professionals involved	Stroke consultant, clinic nurse, immediate access to vascular surgical consultant for same day assessment
Investigations performed	Same day imaging and reporting (Carotid Doppler ultrasound and MRI, where indicated); ECG; blood tests; blood pressure monitoring; BMI calculation
Advice provided to patients	Diagnostic and prognostic information Counselling on lifestyle modification for the secondary prevention of stroke
Follow-up	No routine follow-up at TIA clinic TIA patients discharged back to primary care where GPs are advised to manage patients in line with RCP guidelines RCP targets for blood pressure ($\leq 130/80$ mm Hg) and cholesterol (< 4 mmol/l) are routinely set out in discharge letters

BMI, body mass index; GP, general practitioner; RCP, Royal College of Physicians; TIA, transient ischaemic attack.

Table 2 Royal College of Physicians (RCP) standards (n=163 patients followed up for ≥ 12 months)

	Quality standard: the patient record shows that	Total number of patients with available data	Total number of patients meeting quality standard	Quality standard achieved for patients with available data (%)	Quality standard met for all patients (%)*
1a	Blood pressure (BP) has been documented in the last 12 months	163	147	90.2	NA
1b	Most recent BP $\leq 130/80$ mm Hg	147	57	38.8	35.0
2a	Total cholesterol has been documented in the last 12 months	163	110	67.5	NA
2b	LDL has been documented in the last 12 months	163	90	55.2	NA
2c	Total cholesterol <i>and</i> LDL have been documented in the last 12 months	163	90	55.2	NA
2d	Most recent total cholesterol < 4.0 mmol/l	110	45	40.9	27.6
2e	Most recent total cholesterol < 4.0 mmol/l <i>or</i> 25% reduction in total cholesterol, whichever achieves the lowest absolute value	106	17	16.0	10.4
2f	Most recent LDL < 2 mmol/l	90	37	41.1	22.7
2g	Most recent total cholesterol < 4.0 mmol/l <i>and</i> most recent LDL < 2.0 mmol/l	90	26	28.9	16.0
3a	Antihypertensives are prescribed if BP $> 130/80$: ACE inhibitor <i>or</i> ARB <i>or</i> CCB <i>or</i> thiazide-type diuretic	90	64	71.1	67.0
	Calcium channel CCB	64	29	45.3	NA
	Thiazide diuretic	64	17	26.7	NA
	ACE inhibitor	64	32	50.0	NA
	ARB	64	15	25.0	NA
	1 Class of antihypertensive	64	39	60.9	NA
	2 Classes of antihypertensive	64	21	32.8	NA
	3 Classes of antihypertensive	64	4	6.3	NA
3b	Antithrombotics are prescribed: aspirin <i>and</i> dipyridamole, aspirin alone, clopidogrel <i>or</i> anticoagulation	163	151	92.6	NA
	Aspirin and dipyridamole	163	57	35.0	NA
	Aspirin alone	163	60	36.8	NA
	Clopidogrel alone	163	15	9.2	NA
	Other antiplatelet(s)	163	8	4.9	NA
	Anticoagulant	163	14	8.6	NA
	No antithrombotics prescribed	163	9	5.5	NA
3c	Statins are prescribed if total cholesterol > 3.5 mmol/l <i>or</i> LDL > 2.5 mmol/l (ie, both measured)	72	58	81.0	77.9
4a	Documented in the last 12 months				
	Smoking status	163	140	85.9	NA
	Dietary advice	163	48	29.4	NA
	Exercise advice	163	55	33.7	NA
	BMI	163	72	44.2	NA
	Smokers have been given cessation advice	19	17	89.5	NA
	Overweight (BMI ≥ 25) and obese (BMI ≥ 30) patients have been given weight loss advice (dietary <i>or</i> exercise advice)	58	27	46.6	NA
5a	Combined risk factor control: most recent BP $\leq 130/80$ mm Hg <i>and</i> most recent total cholesterol < 4.0 mmol/l <i>and</i> most recent LDL < 2.0 mmol/l <i>and</i> antithrombotics are prescribed	87	12	13.8	7.4
5b	Combined secondary prevention medication: <i>prescribed an antihypertensive, a statin and an antithrombotic</i>	163	90	55.2	NA

*Assuming that patients with unavailable data did not meet the quality standard.

ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; BMI, body mass index; CCB, calcium channel blocker; LDL, low-density lipoprotein; NA, not applicable.

Seventy-one per cent of patients were prescribed antihypertensive medication according to RCP standards. Overall, 50% were on an ACE inhibitor, 45% were on a calcium channel blocker, 27% were on a thiazide diuretic and 25% were on an angiotensin receptor blocker. Sixty-one per cent of patients on antihypertensive medication were prescribed one class of medication, whereas 39% were prescribed two or more recommended medications. Twenty-nine per cent of patients with blood pressure $> 130/80$ mm Hg were not prescribed any antihypertensive medications (RCP recommendation: initiate antihypertensives if blood pressure $> 130/80$).

Cholesterol targets and statin medication

Overall, 78% of patients had their TC documented in the previous 15 months and 61% achieved the QOF standard of TC ≤ 5.0 mmol/l. In accordance with RCP guidelines, 55% of

patients had their TC and LDL documented within the previous 12 months, with 16% achieving RCP standards of TC < 4.0 mmol/l and LDL < 2.0 mmol/l.

RCP guidelines recommend that patients should achieve a TC < 4.0 mmol/l *or* a 25% reduction in TC, whichever achieves the lowest value.¹³ In this study, a 25% reduction in TC was calculated from the time of TIA diagnosis. Although 28% of patients achieved an absolute target of < 4.0 mmol/l, only 10% met the full RCP standard when lower targets were considered (ie, also satisfying the criteria of 25% reduction in TC from baseline). Excluding the 31% of patients with a past medical history of hypercholesterolaemia at TIA clinic presentation did not substantially change the proportion of patients achieving the full RCP standard (11%).

A total of 72 patients (80% of those with TC and LDL documented in the previous 12 months) were eligible for

Table 3 Quality and outcome framework (QOF) standards (n=121 patients followed up for ≥15 months)

	Quality standard: the patient record shows that	Total number of patients with available data	Total number of patients meeting quality standard	Quality standard achieved for patients with available data (%)	Quality standard met for all patients (%)*
1a	Blood pressure (BP) has been documented in the last 15 months	121	115	95.0	NA
1b	Most recent BP ≤150/90 mm Hg	115	99	86.1	81.8
2a	Total cholesterol has been documented in last 15 months	121	94	77.7	NA
2b	Most recent total cholesterol ≤5 mmol/l	94	74	78.7	61.1
3a	Antithrombotics are prescribed: aspirin, clopidogrel, dipyridamole or a combination; or an anticoagulant	121	114	94.2	NA
	Aspirin and dipyridamole	121	45	37.2	NA
	Aspirin alone	121	43	35.5	NA
	Clopidogrel alone	121	11	9.1	NA
	Other antiplatelet(s)	121	8	6.6	NA
	Anticoagulant alone	121	7	5.8	NA
	Not prescribed antithrombotics	121	7	5.8	NA
4a	Smoking status has been documented in the last 15 months	121	85	70.2	NA
4b	Smoking cessation advice has been offered to patients who smoke	9	9	100	NA
5a	Combined risk factor control: most recent BP ≤150/90 mm Hg and most recent total cholesterol ≤5 mmol/l and antithrombotics are prescribed: aspirin, clopidogrel, dipyridamole or a combination; or an anticoagulant	93	66	71.0	54.5

*Assuming that patients with unavailable data did not meet the quality standard.
NA. not applicable.

statins according to RCP guidelines (TC >3.5 mmol/l or LDL >2.5 mmol/l). Statins were prescribed in 81% of these cases. However, 73 patients did not have their TC or LDL documented in the previous 12 months. Assuming that these patients were all eligible for statins, 78% of a total of 145 potentially eligible patients meet the RCP standard for the prescription of statins.

Box 2 Data collected at baseline and follow-up

Baseline data

- ▶ Demographic variables (age, gender, ethnicity)
- ▶ Blood pressure*
- ▶ Cholesterol (total cholesterol (TC), low-density lipoprotein (LDL))*
- ▶ Random blood glucose*
- ▶ Body mass index*
- ▶ Smoking status*
- ▶ Prescriptions at discharge (antithrombotic, antihypertensive and lipid-lowering medications)†
- ▶ Comorbidities (hypertension, hypercholesterolaemia, diabetes, ischaemic heart disease, atrial fibrillation, previous stroke/transient ischaemic attack (TIA), peripheral vascular disease).

Follow-up data

- ▶ Print out of current prescriptions (antithrombotic, antihypertensive and lipid-lowering medications)
- ▶ Date and result of last blood pressure measurement
- ▶ Date and results of last cholesterol measurements (TC, LDL)
- ▶ Date of most recent lifestyle advice (diet, exercise, smoking cessation).

*Risk factor data were measured at the TIA clinic

†Prescription data refer to the medications that a patient was discharged on (ie, following a review of existing medications and including any new medications prescribed at the TIA clinic).

Lifestyle risk factors

Overall, 34% and 29% of patients were reported to have exercise or dietary advice documented in their primary care record during the previous 12 months, respectively. In addition, 72 (44%) patients had their body mass index (BMI) documented within the same 12-month period. Of these, 36 (50%) were overweight (BMI ≥25) and 22 (31%) were obese (BMI ≥30). Forty-seven per cent of overweight or obese patients had weight loss advice (dietary or exercise advice) documented. Smoking status was documented for 140 patients (86%) during the previous 12 months, of whom 19 (14%) were smokers, with 17 (90%) documented to have received cessation advice.

Combined risk factor control

Of the 87 patients with available data, 12 (14%) achieved the combined RCP standards of blood pressure ≤130/80 mm Hg, TC <4.0 mmol/l, LDL <2.0 mmol/l and prescription of antithrombotic medication. When all patients were considered (n=163), 7% achieved this combined standard if it is assumed that patients with missing data failed to achieve the recommended standards. Overall, 55% of patients were prescribed all three classes of secondary prevention medication (a statin, an antihypertensive and an antithrombotic).

DISCUSSION

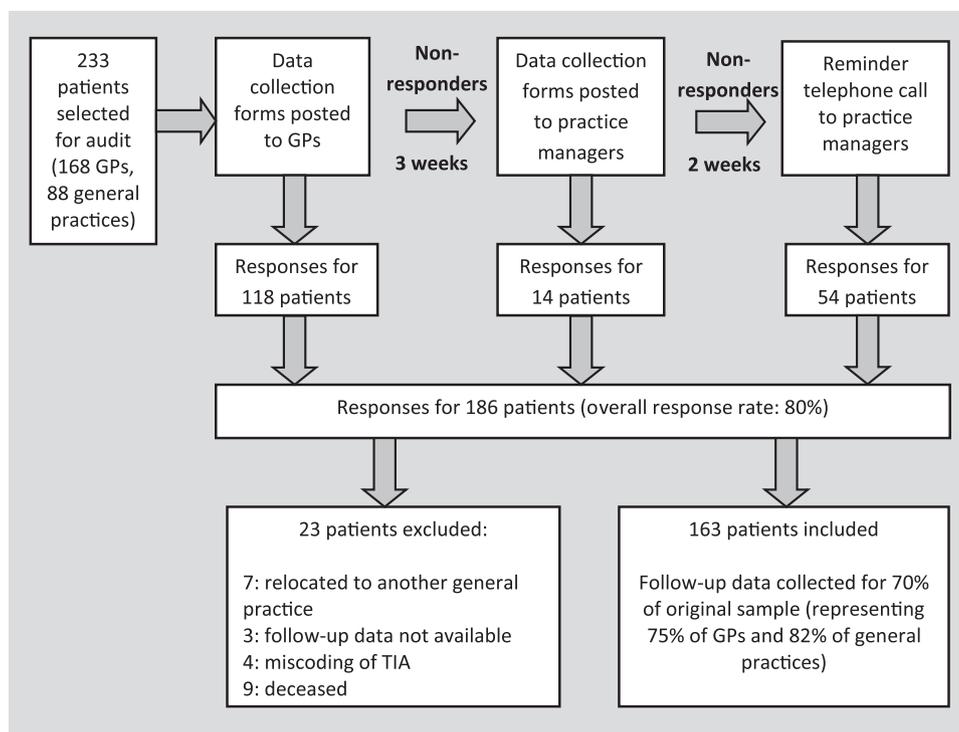
Main findings

To our knowledge, this study is the first to evaluate the quality of secondary stroke prevention among a population of TIA patients recently diagnosed in a specialist TIA clinic. The results suggest that the achievement of RCP quality standards is suboptimal, whereas achievement of QOF standards was good overall. There are various missed opportunities for maintenance of optimal secondary prevention in this high risk population, and potential areas for quality improvement are identified below.

Antithrombotic medication

Although the use of antithrombotic medication was good overall, with 94% of patients prescribed at least one

Figure 1 Follow-up data collection. GP, general practitioner; TIA, transient ischaemic attack.



recommended medication, roughly half of those patients on aspirin were not on concomitant dipyridamole (as recommended in the RCP guideline). While a combination of aspirin and dipyridamole has been shown to be more effective for the prevention of ischaemic stroke than aspirin alone,¹⁶ adverse effects leading to medication discontinuation occur in approximately 16% of patients.¹⁷ However, this does not account for the high proportion of patients not prescribed dipyridamole in this study (50%).

Blood pressure targets and antihypertensive medication

Less than 40% of patients reached the RCP blood pressure standard of $\leq 130/80$ mm Hg and of these, almost 30% were not prescribed an antihypertensive medication in accordance with RCP guidelines. Reducing blood pressure in TIA patients would have significant clinical benefits for the secondary prevention of stroke since a 9/4 mm Hg reduction in blood pressure reduces the risk of stroke by 28%.⁵ It is likely that more than one medication will be required to bring blood pressure under control in around 65% of patients.¹⁸ Thus, combination therapy is recommended from the outset by some authorities,¹⁹ though this is uncommon in clinical practice as in this study (61% on monotherapy). This makes a strong case for initiation with or progression to combination therapy to improve target blood pressure achievement.

Cholesterol targets and statin medication

At follow-up, only 28% of patients achieved a TC < 4 mmol/l (RCP standard) whereas 61% achieved a TC ≤ 5 mmol/l (QOF standard). These data suggest that GPs may not lower TC aggressively once QOF indicators have been met. Furthermore, nearly half of all patients (45%) did not have their LDL measured within the previous 12 months, and only 23% achieved the RCP standard (LDL < 2 mmol/l). Intensive cholesterol lowering, although only 'marginally' beneficial for stroke prevention, has significant benefits for the prevention of cardiovascular events and is therefore recommended in TIA patients.⁶

The RCP guideline recommends a 25% reduction in TC or a target of TC < 4.0 mmol/l, whichever achieves the lowest absolute value. Similarly, a 30% reduction in LDL or a target of LDL < 2.0 mmol/l is recommended. However, baseline TC and LDL values have not been defined; these could be interpreted as pretreatment values or the values at the time of TIA diagnosis. The resulting ambiguity, combined with the need for GPs to set individual patient targets, may contribute to suboptimal cholesterol lowering. A simplified treatment target may facilitate GP adherence to this standard.

Lifestyle risk factors

The documentation of lifestyle advice was generally poor. Lifestyle data are likely to be entered in electronic patient records as free-text and are generally of lower quality than coded data (eg, prescribing and diagnostic data).²⁰ However, available data indicated that rates of overweight and obesity were high (81%) and meta-analysis has demonstrated that this puts patients at high risk of stroke.²¹ Implementation of the National Health Service Health Checks programme, which incorporates strategies for weight management and communication of risk, could facilitate the management of TIA patients.²²

Comparison with other studies

Few studies have examined the status of secondary prevention specifically among TIA patients. Rather, studies have presented combined data for heterogeneous populations of stroke and TIA patients.^{11 12} However, the management of specific risk factors may differ in TIA patients when compared with stroke patients for example, Ramsay *et al* found that a diagnosis of TIA, as opposed to stroke, was associated with lower usage of blood pressure lowering medication in a cohort of older British men.¹⁰

In a cohort of stroke and TIA patients attending a rapid access stroke clinic or undergoing carotid endarterectomy, only 28% achieved a blood pressure $\leq 130/80$ mm Hg and 22% achieved a TC < 4.0 mmol/l.¹¹ Although the proportions of patients achieving these standards are lower than those reported in our

Table 4 Baseline characteristics of 163 patients diagnosed with TIA in a specialist TIA clinic

Characteristics of patients at baseline	% Or mean (SD)	Missing data %
General practice data		
Number of patients per general practitioner, mean (SD)	1.29 (0.58)	
Number of patients per practice, mean (SD)	2.26 (2.28)	
Demographic data		
Age, mean (SD)	71.5 (12.4)	
Male (%)	54.6	
Ethnicity (%)		
Caucasian	85.9	4.9
Asian	9.2	4.9
BMI, mean (SD)	27.7 (4.7)	7.4
Self reported smoking status (%)		
Current	19.0	0.6
Previous	38.7	0.6
Never	41.7	0.6
Comorbidities: past medical history at initial diagnosis (%)		
Hypertension	50.9	
Hypercholesterolaemia	31.3	
Diabetes	13.5	
Ischaemic heart disease	6.1	
Atrial fibrillation	6.7	
Previous stroke/TIA	17.8	
Peripheral vascular disease	2.5	
Achievement of RCP standards		
Most recent BP \leq 130/80 mm Hg (%)	25.2	
Most recent total cholesterol $<$ 4 mmol/l (%)	23.9	2.5
Antihypertensives are prescribed if BP $>$ 130/80	73.0	
Antithrombotics are prescribed: aspirin AND dipyridamole, aspirin alone, clopidogrel or anticoagulation (%)	97.5	
Statins are prescribed if total cholesterol $>$ 3.5 mmol/l (%)	88.9	
Achievement of QOF Standards		
Most recent BP \leq 150/90 mm Hg (%)	62.6	
Most recent total cholesterol \leq 5 mmol/l (%)	57.9	2.5
Antithrombotics are prescribed: aspirin, clopidogrel, dipyridamole or a combination; or an anticoagulant (%)	99.4	

BMI, body mass index; BP, blood pressure; QOF, quality and outcome framework; RCP, Royal College of Physicians; TIA, transient ischaemic attack.

study (35% and 28%, respectively), data were collected 6 months post-TIA (compared with 12–18 months post-TIA in our study) with less time therefore available to achieve risk factor targets. Moreover, this study collected data in 2004–2005 compared with our more recent data from 2009 to 2010.

Strengths and limitations

This study used a collaborative method to collect follow-up data from general practices. A short (5 min) data collection form was devised and resulted in a response rate of 80%. Similar surveys of UK general practices have reported response rates ranging from 46%²³ to 70%;²⁴ the high response rate achieved in our study was facilitated by the use of a short questionnaire with repeat mailing and follow-up telephone contact.²⁵

Despite the high response rate, a limitation of this study concerned the self-selection of general practices. Non-responding practices may have differed systematically from responding practices. Second, data on medication contraindications were not documented in this study. Adverse drug effects are common in primary care settings and may result in medication discontinuation.²⁶ It is therefore likely that this study has under-

estimated the proportion of patients who were prescribed appropriate secondary prevention therapy. Finally, this study did not collect details on the specific nature of lifestyle advice provided to TIA patients for the purposes of secondary stroke prevention. Consequently, the content and comprehensiveness of lifestyle advice cannot be evaluated in relation to RCP guidelines.

This study evaluated the status of secondary prevention in primary care following diagnosis of TIA at one regional TIA clinic. Although such clinics are widely implemented, their precise characteristics are subject to regional variation and may be expected to differ in terms of access to services, comprehensiveness of services and service providers.²⁷ Therefore, further research is required to establish whether the results of this study are generalisable to other TIA populations.

CONCLUSION

In the UK, Department of Health initiatives have led to the widespread implementation of rapid-access TIA clinics, which have been shown to reduce the short-term risk of stroke and are cost-effective.²⁸ However, this study has demonstrated that subsequent monitoring and optimisation of vascular risk factor management in primary care remain suboptimal. The findings exclusively in people who have had a TIA are in agreement with previous research in more heterogeneous groups (including people with TIA or stroke) in highlighting inconsistencies between the achievement of QOF indicators and RCP targets.¹²

Further research is required to identify the potential barriers and enablers to optimising secondary prevention following a diagnosis of TIA. GPs may be unaware of stringent RCP targets or reluctant to adhere to them due to concerns about adverse effects in elderly patients²⁹ and uncertainties regarding the applicability of underpinning evidence.³⁰ Additionally, it has

Main messages

- ▶ Secondary prevention care for transient ischaemic attack (TIA) patients is currently in line with the general practice Quality and Outcomes Framework indicators.
- ▶ However, secondary prevention care deviates from the 'gold standard' recommendations in the Royal College of Physicians national clinical guideline for stroke.
- ▶ Key suggestions for improving quality of secondary prevention post-TIA include: strategies to improve dipyridamole continuation; early consideration of combination antihypertensive therapy; simplification of lipid targets; and a review of Quality and Outcomes Framework targets with a view to intensifying blood pressure and lipid targets.

Current research questions

- ▶ What are the barriers to secondary stroke prevention after a transient ischaemic attack (TIA)?
- ▶ What interventions are effective for optimal long-term secondary stroke prevention following TIA?
- ▶ How should follow-up services be organised in order to optimise secondary prevention after a TIA?

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yet to be demonstrated that more stringent blood pressure targets are achievable in a primary care setting.³¹

Ongoing follow-up in secondary care or by specialist nurses' may facilitate adherence to a more stringent target-based approach to secondary prevention. Currently, a 6 week review of all patients following a TIA is being encouraged by the Department of Health 'Accelerating Stroke Improvement' (ASI) programme, but there remains lack of clarity as to whether this should occur in primary or specialist care. Achievement of QOF criteria is not sufficient for the effective secondary prevention of stroke and more emphasis could be placed on adherence to RCP guidelines. In accordance with a recent report from the National Audit Office,¹ the findings from this study provide strong supportive evidence that a review of QOF targets are indicated in order to better align these with RCP recommendations.

Acknowledgements We would like to thank Dr David Eveson (collaborator) for assisting with data extraction.

Contributors All authors contributed to the conception and design of the study. KL and AM and carried out data extraction and data analysis. All authors contributed to drafting and revising the manuscript.

Funding This study is supported by funds from the Department of Health Sciences and the Department of Cardiovascular Sciences, University of Leicester.

Competing interests AM and KK have received sponsorship for attending conferences and honorariums from pharmaceutical companies that manufacture drugs for the secondary prevention of stroke.

Ethics approval This study was carried out as part of an audit of TIA patient care. Audit approval was obtained from University Hospitals of Leicester NHS Trust, Leicester City Primary Care Trust (PCT) and Leicestershire Country and Rutland PCT. Ethics Committee approval was not required.

Provenance and peer review Not commissioned; externally peer reviewed.

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